

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

**REMARKS**

The Office Action mailed November 6, 2002, has been carefully reviewed and by this Amendment, claims 1-13 have been amended. Accordingly, claims 1-13 are pending in the application. In view of the above amendments and the following remarks, favorable reconsideration of this application is respectfully requested.

The Examiner objected to the the disclosure as containing informalities.

In view of the number of amendments and the Examiner's requirement for new application papers, a substitute specification is filed herewith. Also enclosed is a marked-up copy of the specification as originally filed. No new matter has been added.

The Examiner rejected claims 1-13 under 35 U.S.C. 112, second paragraph, as being indefinite. Applicant has amended the claims to bring them into compliance with 35 U.S.C. 112, second paragraph.

The Examiner rejected claims 1, 2, 4, 5, 7 and 8 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,689,156 to Zibrida, and rejected claims 3, 6, 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Zibrida. The Examiner

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

also rejected claims 11-13 as being unpatentable over Zibrida in view of U.S. Patent No. 5,653,149 to Klingspor et al. Applicant notes that on the PTO-892 provided with the Office Action, the patent to Klingspor et al. is mistakenly identified as Cavanagh.

The present invention is directed to a method and device for treating a liquid effluent of pig slurry which is loaded with significant quantities of nitrogen and phosphorus, on the order of 2-4 kg/ton. The method comprises the steps of adding a basic reagent to such a highly loaded liquid effluent of pig slurry to obtain a pH in the range from 8.5 to 13, and diffusing the basified liquid effluent derived therefrom in a stream of air.

According to Zibrida, two conditions must be satisfied, one regarding the pH and the second regarding the temperature, when the effluent is to be treated without heating. When the temperature of the waste water falls below specified levels, the process disclosed in Zibrida cannot work without heating.

As explained in Zibrida, column 3, the graph temperature of the effluent f(pH) has been drawn as shown in the attached graph. From this graph, it can be seen that for a temperature of 32 F, the pH is over 11, but at 32 F, the effluent is beginning to freeze since the mentioned temperature is that of

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

the droplets (see column 3, line 43). In column 3, lines 36-38, Zibrida mentions that the stripping process lowers the temperature of the effluent in particular meteorological conditions. So it is deemed that the stripping process according to Zibrida lowers the effluent temperature and consequently it is necessary to heat in order to be in the range of temperatures over the FAE curve as shown in the attached graph.

Furthermore, Zibrida explains that in order to counteract such cooling, it is advisable to add sufficient amounts of alkaline reagents to overcome any significant drop in temperature of the suspended droplets. But lime is clearly not known to be an anti-freeze type of product.

Consequently, the process described in Zibrida works without heating for temperatures over 32 F when the pH is about 10.9. Over this pH, the effluent is no longer liquid and must be heated as explained in column 3.

No one of ordinary skill in the art of treating a liquid effluent of pig slurry would look to Zibrida as far too much energy is required to heat either the air or the effluent. For at least the foregoing reasons, claims 1-13 are patentable over the prior art; favorable consideration is requested.

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

Attached hereto is a marked-up version of the changes made to the application by the current amendment. The attached pages are captioned "Version with Markings to Show Changes Made".

With this amendment and the foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE ABSTRACT:**

The abstract has been amended as follows:

--[The invention concerns a] A device [comprising:] for treating a liquid effluent such as pig slurry containing significant quantities of nitrogen and phosphorus, the device including a mixing reactor for contacting the liquid effluent with the basic reagent, provided with an intake for said effluent and another intake for the basic reagent; an ammonia-extracting reactor, connected to [said] the mixing reactor, and a tank for storing the treated liquid effluent derived from the ammonia-extracting reactor. [The invention is, for example, applicable to pig slurry.]--

**IN THE CLAIMS:**

Please amend claims 1-13 as follows:

1. (Amended) A method for treating a liquid effluent of pig slurry [heavily] loaded [especially] with significant quantities of nitrogen and [with] phosphorus, [characterised in that it comprises the following stages] comprising the steps of:
  - a) [addition of] adding a basic reagent to [this] said liquid effluent of pig slurry containing significant quantities

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

of nitrogen and phosphorus to obtain a pH in the range from 8.5 to 13; and

b) [pulverisation of] diffusing the basified liquid effluent derived from stage a) in a stream of air.

2. (Amended) The method according to Claim 1, [characterised in that] wherein the basic reagent added to stage a) is unslaked or slaked lime in the form of powder, paste or liquid.

3. (Amended) The method according to Claim 2, [characterised in that the] wherein a concentration of lime  $[\text{Ca}(\text{OH})_2]$  is a maximum of 1,000 g/litre of reagent.

4. (Amended) The method according to Claim 3, [characterised in that] wherein the stage b) is repeated a [certain] number of times for the same basified effluent.

5. (Amended) The method according to Claim 4, [characterised in that] wherein the [passage] number of repetitions is in the range from 1 to 50.

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

6. (Amended) The method according to Claim 1,  
[characterised in that] wherein at [the] a start of stage b) an  
anti-foam catalyst is added, the quantity of which varies from 0  
to 1 l/m<sup>3</sup> of liquid effluent which is to be treated.

7. (Twice Amended) The method according to Claim 1,  
[characterised in that it likewise comprises] further comprising  
a stage c) [for] of sifting the liquid effluent derived from  
stage b).

8. (Twice Amended) A device for [implementing the method  
according to Claim 1, characterised in that it comprises]  
treating a liquid effluent of pig slurry loaded with significant  
quantities of nitrogen and phosphorus by adding a basic reagent  
to said liquid effluent to obtain a pH in the range from 8.5 to  
13 and diffusing the basified liquid effluent derived in a stream  
of air, the device comprising:

a mixing reactor for bringing the liquid effluent of pig  
slurry loaded with significant quantities of nitrogen and  
phosphorus into contact with the basic reagent, said mixing  
reactor provided with an intake for [this] said effluent and  
another intake for the basic reagent;

Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

an ammonia-extracting reactor [(1),] connected to the mixing reactor[,]; and

a tank for storing the treated liquid effluent derived from the ammonia-extracting reactor [(1)].

9. (Amended) The device according to Claim 8,  
[characterised in that] wherein the mixing reactor [comprises]  
includes a device for measuring the pH of the medium connected to  
a means situated on the intake for the basic reagent for  
regulating automatically the added quantity thereof.

10. (Amended) The device according to Claim 9,  
[characterised in that] wherein the ammonia-extracting reactor  
[(1)] or degassing reactor comprises a lower part [(2)]  
collecting in particular the basified liquid effluent and an  
upper part [(5)] in which there is situated a [pulverisation]  
diffusion rack [(4)] provided with nozzles [(6)], connected at  
the lower part [(2)] to said reactor [(1)] and[  
comprising] including a feed pump [(7)], openings [(8)] being  
arranged between the two parts to allow exterior air to enter,  
and an exhaust air fan being connected to said upper part [(5)].



Serial No.: 09/830,166  
Atty. Docket No.: P66538US0

11. (Amended) The device according to Claim 10,  
[characterised in that] wherein the [pulversiation] diffusion  
rack [(4) comprises] includes nozzles [(6)] of the cyclone type.

12. (Amended) The device according to Claim 10,  
[characterised in that] wherein the upper part [(5)] of the  
degassing reactor [(1)] is connected to a [devesiculer (9)]  
moisture-reducing unit.

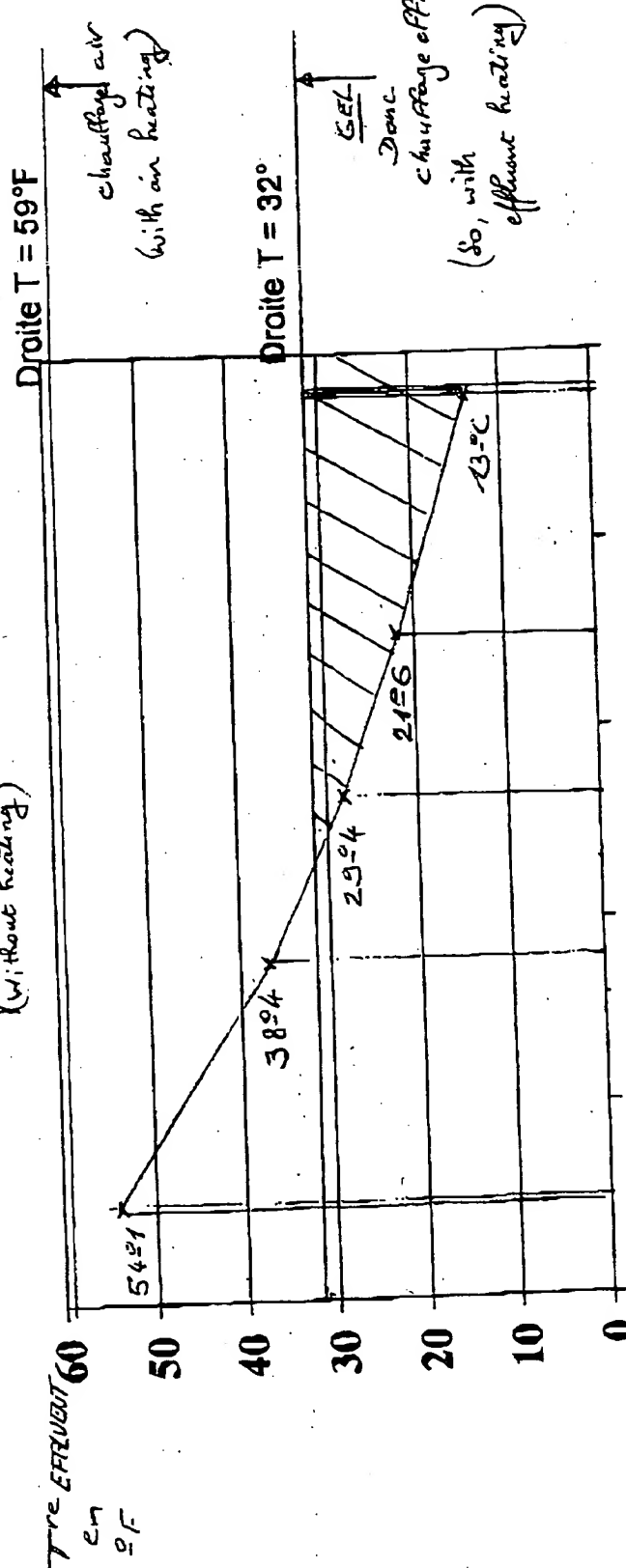
13. (Amended) The device according to Claim 12,  
[characterised in that it comprises] further comprising a washing  
tower connected to the [devesiculer or any other means] moisture-  
reducing unit allowing the ammonia to be collected or eliminated.

# Brevet US traitement lisier

## GRAPHE de la FAE

ZIBRIDA et conditions de fonctionnement suivant indications de la colonne 6

SAVS CHAUFFAGE  
(without heating)



10,5 10,8 11 11,2 11,5

Pour une FAE de 12,4 mini, si pH = 10,5 - T = 54,15°F; pH = 10,8 - T = 38,4°F; pH = 11 - T = 29,4°F; pH = 11,2 - T = 21,6°F; pH = 11,5 - T = 13,65°F

La droite T = 59°F correspond à la ligne de chauffage air cf colonne 3 ligne 54

La droite T = 32°F correspond à la limite technique liquide - gel cf col 3 lignes 43 à 46.